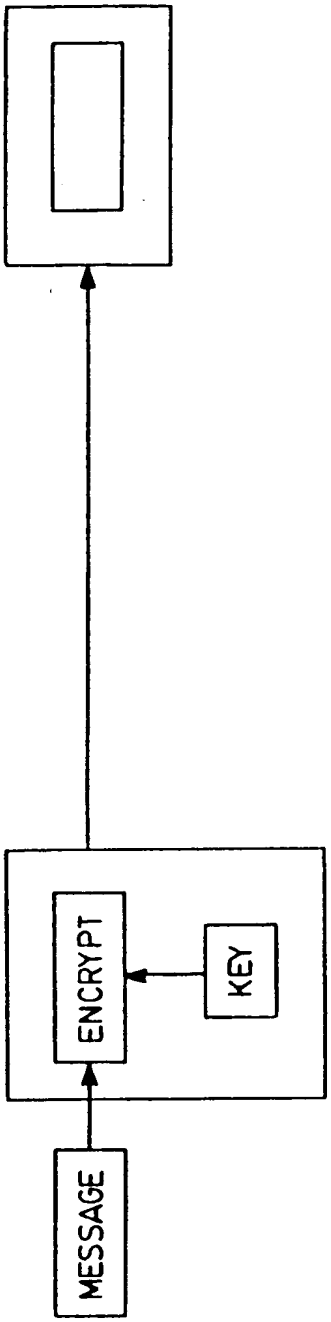


FIG. 1

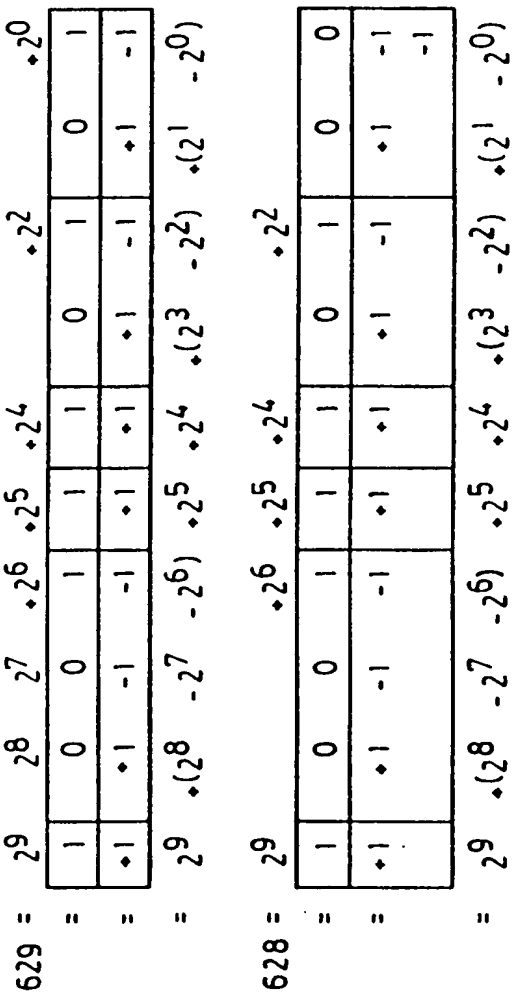
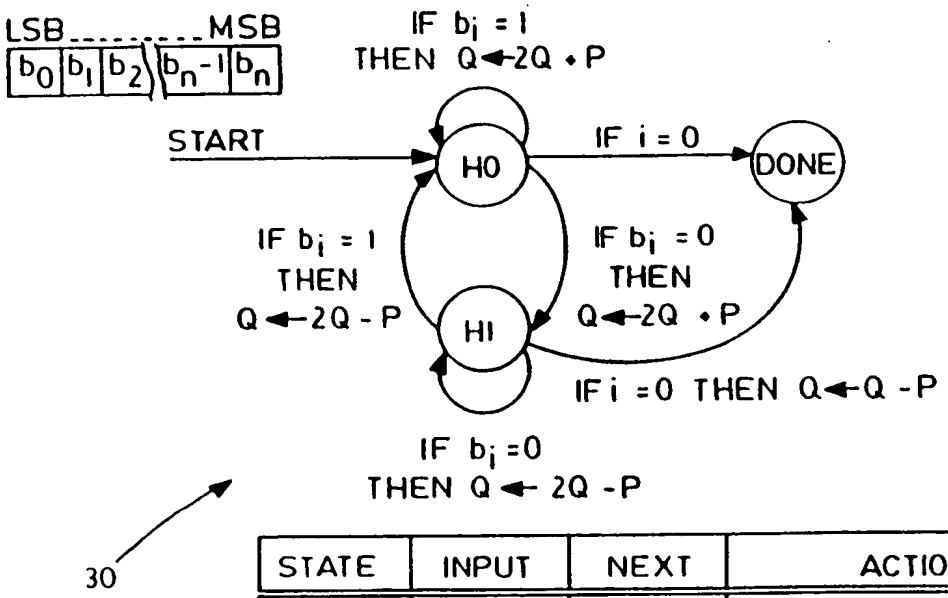

629 = 2^9 2^8 2^7 2^6 2^5 2^4 2^2 2^0
1 0 0 1 1 1 0 1
= +1 +1 -1 -1 +1 +1 -1 -1
= 2^9 +(2^8 -2^7 -2^6) 2^5 +2^4 +(2^3 -2^2) +(2^1 -2^0)
628 = 2^9 2^8 2^7 2^6 2^5 2^4 2^2 2^0
1 0 0 1 1 1 0 0
= +1 +1 -1 -1 +1 +1 -1 -1
= 2^9 +(2^8 -2^7 -2^6) 2^5 +2^4 +(2^3 -2^2) +(2^1 -2^0)

FIG. 2



STATE	INPUT	NEXT	ACTION
H0	$i < 0$	DONE	SUBTRACT
H0	$b_i = 0$	H1	DOUBLE, ADD
H0	$b_i = 1$	H0	DOUBLE, ADD
H1	$i < 1$	DONE	
H1	$b_i = 0$	H1	DOUBLE, SUBTRACT
H1	$b_i = 1$	H0	DOUBLE, SUBTRACT

FIG. 3

```
BEGIN:
    i := N          ; START FROM MSB                          L1
    Q := 0          ; INITIALIZE ACCUMULATOR                  L2
    H := 0          ; INITIALIZE STATE                        L3

LOOP:               ; FOR ALL BITS
    Q := Q + Q      ; DOUBLE ACCUMULATOR                      L4

    IF H = 0        ; IF H STATE IS SET                       L5
      Q := Q + P    ;   ADD BASE POINT TO ACCUMULATOR         L6
      GOTO ENDLOOP  ;                                         L7
    ELSE            ; ELSE
      Q := Q + (-P) ;   SUBTRACT BASE POINT                   L8
      GOTO ENDLOOP  ;                                         L9

ENDLOOP:
    H := b[i]       ; SET H STATE TO VALUE OF b[i]            L10
    i := i - 1      ; PROCESS NEXT BIT                        L11
    IF i>0          ; IF BIT EXISTS                           L12
      GOTO LOOP     ;   CONTINUE AT TOP OF LOOP               L13

    IF H = 0        ; IF EXISTING FROM H = 0 STATE            L14
      Q := Q + (-P) ;   CORRECT RESULT BY FINAL SUBTRACT      L15
    END                                                       L16
```

FIG. 4

```
BEGIN :
        i : = N          ; START FROM MSB                          LL1
        Q : = 0          ; INITIALIZE ACCUMULATOR                  LL2

H0 :                     ; STATE ENTRY POINT
        Q : = Q * Q      ; DOUBLE ACCUMULATOR                      LL3
        Q : = Q * P      ; ADD BASE POINT TO ACCUMULATOR           LL4
        GOTO ENDLOOP     ; BRANCH TO END OF LOOP TESTS             LL5

H1 :                     ; STATE ENTRY POINT
        Q : = Q * Q      ; DOUBLE ACCUMULATOR                      LL6
        Q : = Q * (-P)   ; SUBTRACT BASE POINT FROM ACCUMULATOR    LL7
        GOTO ENDLOOP     ; BRANCH TO END OF LOOP TESTS             LL8

ENDLOOP :                ; END OF LOOP TESTS
        IF b[i]=1        ; IF CURRENT BIT IS SET                   LL9
          GOTO NEXT H0   ;   FOLLOW H0 PATH                        LL10
                         ; ELSE FALL INTO H1 PATH

NEXT H1 :                ; H1 PATH
        i : =i-1         ; PROCESS NEXT BIT                        LL11
        IF i>0           ; IF BIT EXISTS                           LL12
          GOTO H1        ;   EXECUTE H1 STATE                      LL13
        Q : = Q * (-P)   ; ELSE CORRECT RESULT AND END             LL14
        END                                                        LL15

NEXT H0 :                ; H0 PATH
        i : =i-1         ; PROCESS NEXT BIT                        LL16
        IF i>0           ; IF BIT EXISTS                           LL17
          GOTO H0        ;   EXECUTE H0 STATE                      LL18
        END              ; ELSE END                                LL19
```

FIG. 5

```
BEGIN :
        i : = N
        Q : = 1

H0 :
        Q : = Q·Q  (Q^2)
        Q : = Q·M
        GOTO ENDLOOP

H1 :
        Q : = Q·Q
        Q : = Q/M  (Q-M-1)

ENDLOOP :
        IF b[i] = 1   GOTO ENDLOOP

NEXT H1 :
        i = i - 1
        IF i > 0
        GOTO H1
        Q = Q/M
        END

NEXT H0 :
        i = i - 1
        IF i > 0
        GOTO H0
        END
```

60

FIG. 6

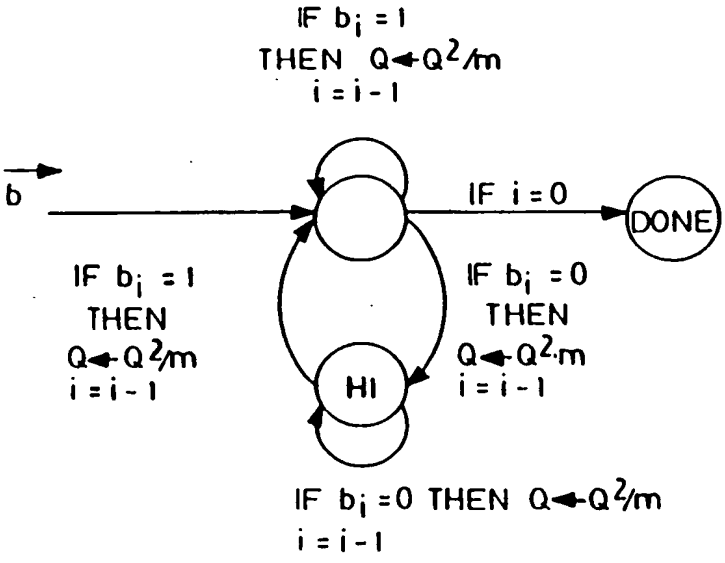

IF $b_i = 1$
THEN $Q \leftarrow Q^2/m$
$i = i - 1$
b
IF $i = 0$
DONE
IF $b_i = 1$
THEN
$Q \leftarrow Q^2/m$
$i = i - 1$
IF $b_i = 0$
THEN
$Q \leftarrow Q^2 m$
$i = i - 1$
HI
IF $b_i = 0$ THEN $Q \leftarrow Q^2/m$
$i = i - 1$

FIG. 7

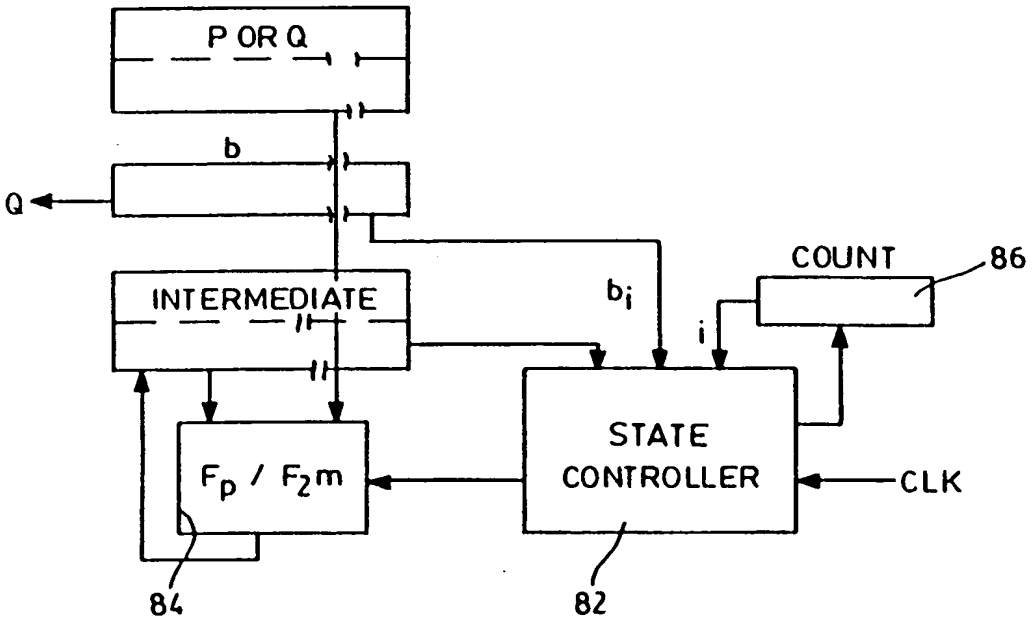

P OR Q
b
Q
INTERMEDIATE
b_i
i
COUNT
86
STATE
CONTROLLER
CLK
F_p / $F_2 m$
84
82

FIG. 8